

DYNAMO PARAMETERS IN YOUNG SUNS: A KEPLER STUDY OF DIFFERENTIAL ROTATION AND ACTIVE REGION DECAY RATES IN NGC 6811 (1 GYR) AND NGC 6819 (2.5 GYR)

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The formation and evolution of a magnetic dynamo is an integral part of the evolution of low-mass stars and the basis for a wide variety of observable phenomena in such stars. Yet despite decades of observational and theoretical study, we do not have a predictive dynamo model even for the best studied case - the Sun. A limiting factor has been the difficulty of making observations that can properly constrain key physical properties, such as differential rotation and turbulent diffusivity, important to understand and model the stellar dynamo. We propose to take advantage of Kepler's superb photometry to measure differential rotation as well as the growth and decay rates of surface active regions (a proxy for diffusivity) for 235 known members of the open clusters NGC 6811 (1 Gyr) and NGC 6819 (2.5 Gyr). The proposed study will more than triple the existing differential rotation measurements for dwarf stars over a wide range of masses, with the added advantages of having fixed metallicity and well determined ages. This work will also yield the first extensive survey of the growth and decay rates in homogeneous samples of dwarfs. We will also explore the frequency of magnetic grand minima at younger ages. Our measurements will add important new constraints on magnetic dynamos in stars, permitting better, more physically realistic models.